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Studies in N.A.
TRICHOPTERA, 1

Lorus J. Milne

1934

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Further Errata;

p. 3, line 4, read "straight ventro-caudad."

28, read "♀ 8th sternite broad:"

7, line 10, read " a. **Agrypnetes** M'L."

8, genus *Limnocentropus* Ulm., read

"**29.** *borneonius* Ulm.

30. *insolitus* Ulm.

Haplotype.

a. *himalayanus* Mart."

This will alter the numerals up to No. 52.

9, after line 5, column 1, insert

"**52.** *tibetana* Mart."

ibid., column 2, for "**Ecclisopteryx**," read "**Ecclisomyia**
after "**concatenata** Wlk., '52," insert "Genotype."

10, line 3, for " 1st " read " 3rd."

30, for "*palpalis*" read "*palpata*,"

15, couplet 25, for "(24.)" read "(22.)" "

19, after No. 19, insert synonyms - "*micans* Hag., '61 ; *sagitta*
Hag., id.; *flaveolata* Hag., id.; *parvula* Bks., '99; *flavida*
Bks., id.; *inornata* Bks., '07; *apicalis* Bks., id.; *incerta* Bks.
'07 nec Wlk., '52."

after No. 25, insert synonym - "*floridana* Bks."

25/6/32

Studies in North American TRICHOPTERA, 1.

by Lorus J. Milne.

Cambridge, Mass.
1934.

STUDIES IN NORTH AMERICAN TRICHOPTERA, 1

by Lorus J. Milne.

The difficulties and delays inherent in publication of revisional papers has led the author to the present series of privately-printed articles; copies may be obtained from him at cost. It is hoped that their usefulness will justify their production. In the researches already completed, families *Phryganeidae*, *Mollannidae* and *Leptoceridae* received detailed study. The type material of H.A.Hagen, Mr Nathan Banks and the writer has been gone over, resulting in some new synonymy; study of the specimens in a number of collections (1.) indicated that Dr Martynov had not gone far enough in the generic revision of *Phryganeidae* (2.) because of unfamiliarity with our fauna; and a perusal of early literature revealed several names antedating some which he used. A key to species followed by brief notes seems to be most compact. A check-list of descript species in each of the above-mentioned families has been added; only new synonymy and that pertinent to North American species has been given.

Key to the North American species of PHRYGANEIDAE.

1. In hind wings m-cu bent in a distinct U toward wing-base 2.
Never more than feebly curved in that direction .. 10.
2. [1.] Wings scarcely hairy; legs with few or no spines; small, yellowish species, usually lacking free Sc1:
Agrypnia Curtis 3.
Fore wings quite hairy; tibiæ spiny; large gray species, Sc1 normally present in fore wings: *Dasyptegia* Wall.6.
3. [2.] Protarsal segments 2 - 4 short; mesotarsi compressed, fringed posteriorly; wings especially narrow - subgenus *Agrypnetes* McL.
Sole N.A.species : *A. (A.) straminea* Hagen.
None of the above 4.

1. The Canadian National Collection at Ottawa, Ont; that of the Harvard Museum of Comparative Zoology, at Cambridge, Mass.; that of the American Museum of Natural History at New York City; of the U. S. National Museum at Washington, D.C.; and of a list of smaller institutions and private collectors who have loaned or generously donated specimens.

2 Martynov, Andreas V., "Preliminary Revision of the family PHRYGANEIDAE, . . . , " in Ann. & Mag. of Nat. Hist; 1924; Ser. 9, vol.14, pp. 209 - 224

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4. [3.] Interocellar area elevated; tibial spines black; 2nd ♂ gonopod segment arising almost apically on 1st, irregularly bulbous, very hairy internally; parameres fused with ædeagus to its apex, projecting straight ventro-caudad: subgenus *Phryganomyia* Banks.
Sole N. A. species : *A. (P.) glacialis* Hagen.
Interocellar area not elevated; tibial spines pale; 2nd ♂ gonopod segment arising nearer base than apex of 1st, slender, not conspicuously hairy; parameres diverge from ædeagus laterad well before its tip, bowed caudad. then medio-ventrad:sg. *Agrypnia* s.str.
In N. A.: *A. (A.) Pagetana* Curtis *nearctica* n. ssp.

Original description: -

Holotype ♀, At'baska Delta, Fort Chipeywan, Alta. July 9, '20; F. Harper collector, " "Type 19514," Harvard Museum of Comparative Zoology. Facies of the typical subspecies, but readily distinguished by the genitalia; the 8th tergite has the lateral pair of apical prolongations extending beyond the submedian pair by nearly the length of the emargination between them; this notch rather open V-form. Length of fore wing 13.5 mm. The ♂ unknown.

6. [2.] Anal and apical margins of fore wing conspicuously chalkier than elsewhere, forming a broad mid-dorsal irregular-margined longitudinal stripe in unspread specimens; ♂ gonopod with a prominent caudal tubercle. ♀ genitalia very narrow: subg. *Jyrvia* n.sg.
In N. A. : *D. (J.) vestita* (Walker,) subgenotype.
Fore wings reticulately mottled; ♂ gonopod not as above; 8th sternite broad 7.
(Vide Can. Ent. 1931; 43; pp. 229 & 231)
7. [6.] One-segmented ♂ gonopod with a slender, caudal, sub-apical tooth at 90° to long axis subg. *Dasystegia* s.str.
Sole N. A. form : *D. (D.) obsoleta deflata* (Milne.)
Two-segmented ♂ gonopod not as above: subgenus *Prophryganea* Martynov. 8.
8. [7.] Legs entirely pale, spines pale; body yellowish; wings yellowish, mottled with whitish or immaculate: ♀ much more robust than ♂ *D. (P.) colorata* (Hagen.)
Legs banded with brown or black; body dark; fore wings ashy mottled with white, ♀ not much more sturdy than male 9.

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9. [8.] Expanse of ♂ 40 - 44 mm.; 10th tergite with a row of large spines apically; ♀ still unknown:
D. (P.) macdunnoughi (Milne.)
 Expanse not over, ♂ 35 mm., ♀ 40 mm.; ♂ 10th tergite not as above: *D. (P.) improba* (Hagen.), s. restr.
10. [1.] Fore wing quite hairy, much more rounded apically and broader in ♂ : *Phryganea* L. 11.
 Wings practically glabrous, equally broad and rounded in the two sexes 13.
11. [10.] Hind wings, at least at base, paler than anterior half of fore wings; in latter, post-cubital area noticeably pale; tibial spines black: subg. *Neophryganea* Mart. 12.
 Wings uniformly dark except for a few white flecks; tibial spines pale: subgenus *Yphria* n. subg.
 Haplotype : *Phryganea californica* Banks.
12. [11.] Hind wings decidedly darker beyond anastomosis, rather yellow in the basal area of fresh specimens:
P. (N.) sayi Milne.
 Neither of the above *P. (N.) cinerea* Walker.
13. [10.] Discal cell of fore wing not more than four times as long as wide; Cua1 sharply bent, appearing as "non-angulate arculus," i.e. m-cu going direct to Cua2: 14.
 Discal cell five to six times as long as wide; Cua1 not appearing to come from m-cu, i.e. "arculus angulate." 20.
14. [13.] Expanse over 35 mm.; hind wings dark basally; face yellow fore wings with coarse black blotches:
Eubasilissa Martynov.
 Species in N. A. *E. pardalis* (Walker.)
 Expanse less than 30 mm.; not the above combination of characters 15.
15. [14.] Hind wings dark basally; fore wings dark; face black:
Oligostomis Kolenati, (*partim*)
 Species : *O. ocelligera* Walk.
 Not so 16.
16. [15.] R2 in fore wing arises at middle of discal cell ... 17.
 R2 arises either much beyond or much before middle

- of discal cell : *Banksiola* Martynov. . . 18.
- 17.[16.] Male gonopods apparently one-segmented, heavy-set, with a brief apical tooth, ♀ 8th sternite not with four distinct teeth *Oligostomis* Kol. (*partim*)
Species : *O. canadensis* (Banks.)
Male gonopods evidently two-segmented, basal piece apically with a long slender projection, parallel to, and about equal in length to 2nd segment; apical margin of ♂ 8th sternite with four distinct teeth :
Oligotricha Rambur.
Sole species in N.A. : *O. Lapponica* (Hagen.)
- 18.[16.] In fore wing R1 arises before middle of discal cell : *B. concatenata* (Walker.)
In fore wing R1 arises beyond middle of discal cell. 19.
- 19.[18.] Fore wing blotch-interspaces with few reticulations : *B. dossuaria* (Say.)
Wings with blotch-interspaces finely reticulate with brown : *B. smithi* (Banks.)
- 20.[13.] R1 in fore wing sinuate subapically; ♂ 9th sternite not prominent, gonopods flattened, approximate basally; ♀ still unknown : *Fabria* n.g. 21.
R1 not sinuate; ♂ gonopods more thick-set; 9th sternite prominent, hollowed internally, cusped, concealing gonopod bases; four closely related species : *Ptilostomis* Kol. 22.
- 21.[20.] Expanse more than 18 mm. : *F. inornata* (Banks.)
Expanse not over 12 mm. : *F. complicata* (Banks.)
- 22.[20.] Tibial spines brown; hind wings immaculate, fore pair finely reticulate with brown : *P. angustipennis* (Hag.)
Tibial spines yellow; hind wings with a distinct subapical lunule, fore pair more coarsely marked 23.
- 23.[22.] Male 10th tergite with long median projection, flanked by two progressively shorter pairs; last ♀ tergite squarely emarginate *P. ocellifera* (Walker.)
Not as above : 24.

24. [23.] Tenth ♂ tergite a wide plate with a long protuberance from its base each side; median lobe of last ♀ sternite projects beyond teeth on each side of it:

P. postica (Walker.)

Tenth ♂ tergite reduced to a pair of submedian rami, with the usual basal projection each side; ♀ not as above:

P. semifasciata (Say.)

Notes:

1. The holotype ♀ of *A. P. nearctica* has 4-segmented maxillary palpi but seems quite normal otherwise; the M.C.Z. ♂ of *P. californica* exhibits the opposite irregularity, having 5-segmented palpi; several other examples have come to hand; partial gyn-andromorphism is a plausible explanation. In *Leptoceridae*, like instances involve wing venation.

2. Few cases present as many complexities as the synonymy of *Oligotricha*, here resurrected. *Neuronia* was mentioned without species or description by W.E. Leach in his 1815 section on "Entomology," in the *London & Edinburgh Encyclopedia*, p. 136, in the trouble-making announcement of a forthcoming paper by that author, "Trichoptera Systematica," which was never published. But several entomologists of the day must have been in possession of the MSS, or had access to a collection arranged by it, since all the mentioned genera, with a few additions, were soon applied to good species-groups, *but not by Leach!* In his "Guide to an Arrangement of British Insects," in 1829, John Curtis omitted an interrogation mark, tying down *Neuronia* by quoting in it as sole species, *Phryganea fusca* L. Space does not here permit an account of the further history of the name *Neuronia*; it now concerns Plecoptera, and will replace *Leuctra* Steph. if Linnæus' species be retained there. *Oligotricha chloroneura* Rbr. is herein designated type of the 1842 genus; since it has been given as identical with *Neuronia ruficrus* Scop., and since Wallengen's 1880 battle with Hagen and McLachlan seems won though forgotten, *Phryganea striata* L. must stand as genotype of *Oligotricha* by reversion.

3. New genus *Fabria* shows closest affinity to *Ptilostomis*, but is very distinct from it and all others in the genitalia of the one known sex, and in the venational characters mentioned in the key.

Check-list of descript species of PHRYGANEIDAE .

(Exclusive of fossil and amber species, synonyms not in N.A., and a number of old names of unknown position, requiring careful treatment by an European worker.)

The notation used in the check-list requires some explanation: italics indicate synonyms, bold face is for categories represented in North America; for these latter, the date of description has been added in abbreviated form.

Agrypnia Curtis, '34.

Agrypnetes McL. '76.

1. **crassicornis** McL.

Haplotype

2. **straminea** Hag. '73.

curvata Banks, '00.

obscura Banks, '07.

b. **Agrypnia** s.str.

3. **Pagetana** Curt.

Haplotype

a. **hyperborea** McL.

b. **nearctica** Milne, '34.

c. **Phryganomyia** Bk. '07.

4. **glacialis** Hagen. '73.

alascensis Bks. '00.

5. **picta** Kol.

Dasystegia Wall. '80.

a. **Dasystegia** s.str.

6. **obsoleta** Hagen.

Genotype here set

a. **deflata** Milne, '31.

b. **reticulata** Mart.

b. **Prophryganea** Mart.

7. **improba** Hag., '73.

8. **ulmeri** Mart.

9. **principalis** Mart.

Genotype

10. **colorata** Hag. '73.

bradorata Milne, '31.

1. **sordida** M'L.

2. **macdunnoughi** Mil.

3. **czerskyi** Mart.

4. **umbrina** Mart.

c. **Jyrvia** Milne, '34.

5. **Sahlbergi** McL.

6. **varia** Fab.

7. **vestita** Walker, '52.

Genotype here set

commixta Walk., id.

Phryganopsis Mart.

8. **latipennis** Bks.

Haplotype

Trichostegia Kol.

9. **minor** Curt.

Genotype here set

Phryganea L. 1758.

a. *Phryganea* s.str.

20. grandis L.

Genotype

1. *rotundata* Ulm.

2. *Nattereri* Brauer.

3. *bipunctata* Retz.

striata auctt. nec L.

b. *Neophryganea* Mart.
1924.

4. *cinerea* Walk., '52.

Genotype here set

5. *sayi* Milne, '31.

interrupta Say, nec
L.

c. *Yphria* Milne, '34.

6. *californica* Bks. '07.

Haplotype

Colpomera M'L.

7. *japonica* McL.

8. *sinensis* M'L.

Haplotype

Limnocentropus Ulm.

9. *borneonius* Ulm.

30. himalayanus Ulm.

1. *insolitus* Ulm., '07.

Haplotype

Semblis Fab., 1775.

2. *atrata* Gm.

3. *chinganica* Mart.

4. *melaleuca* McL.

5. *phalænoides* L.

Genotype here set

(Also type of *Olo-*

stomis G.&P., and

of *Simblis* Billberg
and to avoid the
future use of *Sem-*
bris Fab., '87, for
a sialid genus, this
species is here set
as its type.)

Neurocyta Nav., '16.

36. arenata Navas.

Haplotype

Oligotricha Rambr. '42.

7. *Lapponica* Hag. '64.

reticulata Zet. nec L

stigmatica Hag. '73.

8. *soochowica* Ulm.

9. *striata* L.

Genotype here set;

see note two, p.6.

ruficrus Scop.

fusca Steph. nec L.

analisis Kol. nec Fab.

chloroneura Rbr.

Oligostomis Kol., '48.

40. canadensis Bk. '07.

1. *fluvipes* Mats.

2. *ocelligera* Wlk. '52.

styripes Hag. '73.

3. *reticulata* L.

Genotype

4. *Stalii* McL.

Hagenella Mart. '24

5. *apicalis* Matsum.

6. *clathrata* Kol.

7. *dentata* Mart.

8. *melanoptera* Wll.

9. *sibirica* Mart.

Genotype

Eubasilissa Mart. '24.

50. M'lachlani White.

1. **pardalis** Walk.

2. **regina** McL.

Genotype

Banksiola Mart., '24.

3. concatenata Walk.,
'52.

irrorata M'L., '63,
nec Hag.

4. dossuaria Say, '23.

plurifaria Hag. '73.

5. smithi Banks, '14.

irrorata Hag. '64,
nec Fab.

Ooptergia Mart. '30.

6. asiatica Bett.

7. brunnea Mart.

Haplotype

Fabria Milne, '34.

8. inornata Bks., '07.

Genotype here set

9. complicata Bk., '07;

(Appreciation is

due Mr. J. H. Roberts for drawing the author's attention to this species described in **Ecclisopteryx**.)

Ptilostomis Kol., '59.

60. angustipennis Hag.

1. **ocellifera** Wlk. '52.

2. **postica** Walk. *ibid*.

3. **semifasciata** Say.
'23.

Genotype

fusca Walker, *ibid*.

Kovalevskii Kol. '59

subfasciata Wlk. *id*.

fasciata Wlk., *ibid*.

Incertæ sedis :

64. divulsa Wlk. '60.

5. reginella Nak. '13.

6. ulmerina Nav. '20.

7. Chaffanjoni Nav.,
'22.

8. Legendrei Nv. *id*.

9. maxima Iwata, '27.

70. kawamurai Iw. *id*.

1. **kyotoensis** Iw. *id*.

Key to the North American species of **MOLANNIDAE**.

1. Length-to-width ratio in fore wings, ♂ 3 : 1, ♀ 4 : 1, *i.e.*, wings much abbreviated and broadened:

Molannodes McL.

Sole N. A. species : *M. rufa* (Hagen.)

- Length-to-width ratio, ♂ 5 : 1, ♀ 6 : 1, *i.e.*, wings elongate and narrow: *Molanna* Curtis.... 2.

2. [1.] Second and base of 3rd segment of maxillary palpi with a tuft of erect black hair strongly contrasted with hair

elsewhere; anal venation lost in ♂ hind wing:

subgenus *Molanneria* Martynov .. 3.

Second never, but 1st sometimes lacking black hair; ♂ hind wing anal veins always present *Molanna* s.str. 4.

3. [2.] Labial palpi short, long haired; fore wings with no white marks, but with patches of scaly black and brown hair; ♂ hind wing Cu branched, both arms running into margin well before wing apex: *M. blenda* Sibley.

Labial palpi elongate, short haired; fore wings with no scaly hair, but with two transverse bands of whitish hair; ♂ hind wing Cu very strong, running into margin almost at apex: *M. cinerea* Hagen.

4. [2.] Antennæ, tibiæ and tarsi clear yellow, with whitish yellow hair; maxillary palpi with a patch of black hair on dorsum of 2nd segment and base of 3rd; immaculate yellow wings scantily clothed with pale hairs:

M. flavicornis Banks.

Antennæ and legs brown, hair concolorous; wings brown with grayish hair and two white transverse bands: *M. uniophila* Vorhies.

Note:

Proportions of parts in the maxillary palpi are very useful in checking the identification of these species. From base to apex these are; in *rufa* 5,5,8,11,10; in *blenda* 4,2,7,8,10; in *cinerea* 2,4,10,11,11; in *flavicornis* 4,8,6,8,5; and in *uniophila* 2,4,8,10,10.

Check-list of descript species of MOLANNIDAE .

- | | |
|------------------------------|----------------------------------|
| Molanna Curtis, '34. | 5. flavicornis Bks., '14. |
| a. Molanna s.str. | 6. mixta Hagen. |
| 1. albicans Zett. | 7. nervosa Ulmer. |
| <i>palpalis</i> McL. | 8. submarginalis M'L |
| 2. angustata Curtis. | a. caudata Martynov |
| Haplotype | 9. uniophila Vor., '09. |
| 3. carbonaria McL. | 10. walgrena n.nom. |
| 4. distinguenda Wall. | <i>albicans</i> Wall., '70. |

- b. *Molanneria* Mrt. '10.
 11. *blenda* Sibley, '26.
 2. *cinerea* Hagen, '61.
 3. *cupripennis* Ulm.
 4. *falcata* Ulmer.
 5. *moesta* Banks, '06.
 Genotype here set

- Molannodes* M'L., '66.
 16. *rufa* Hagen, '61.
 7. *tineta* Zett.
Zelleri M'L.
 Haplotype
Steini McL.

Key to the North American species of LEPTOCERIDAE.

1. In hind wings, Cu not forked; spurs 2,2,2..... 2.
 Cu forked; anastomosis seldom conspicuously white and
 swollen 11.
2. [1.] Fore wings with shaggy grayish hair; no scale on basal
 antennal segment; ♂ gonopods large and thin, dense-
 ly hairy, concealing the structure of the other genitalic
 parts by enveloping them; lateral plates of ♀ abdomen
 little developed: *Ylodes* n. gen. .. 3.
 Fore wings with yellow or brown silky hair; basal seg-
 ment of ♂ antenna with a longitudinal scale above;
 ♂ gonopods with an apical and a median projection,
 not enveloping the other genital processes; ♀ abdo-
 men with large latero-caudal flap-form appendages
 used in carrying the egg mass : *Trienodes* McL. .. 4.
3. [2.] Fore wings with yellowish gray hair : *Y. grisea* (Bks.)
 Fore wings black-flecked, with ashy hair :
Y. frontalis (Banks.)
4. [2.] In hind wing, r-m nearer fork of M than that of R; fore
 wing dark apically : *T. dentata* Banks.
 Not as above..... 5.
5. [4.] Females: (at present apparently unnamable; one name
 rests on this sex) *T. borealis* Banks.
 Males: 6.
6. [5.] Tenth ♂ tergite forked, heavily sclerotised, with several
 conical brown teeth at apices: *T. injusta* Hag.
 Tenth ♂ tergite not forked 7.

7. [6.] Gonopod with dorso-median projection vestigial, the main body depressed, small, apically obliquely truncate, shortest medially, the hind border set with many denticles : *T. helo* n. sp.

Original description: -

Holotype ♂, "N.C.," "Type 19546," Museum of Comparative Zoology. Very distinct in the genitalia; yellow like the other species of the genus, the fringe on fore wing darkest at anal angle. Length of fore wing 7 mm.

Genitalia not as above 7.5.

- 7.5. [7.] Tenth tergite very short, bifid, gonopods depressed, emarginate, the lateral apex nearer base than is the submedian : (a small n.sp. near *helo*, here represented by single ♂ lacking data; Dr. Cornelius Betten has a specimen of this from Lake Forest, Ill.)

Not as above : 8.

8. [7.5] Tenth tergite long, very slender, slightly curved to one side apically; latero-caudal projection on gonopod little longer than medial one: *T. flavescens* Banks.

Not as above 9.

9. [8.] Appendages of 10th tergite reaching as far caudad as any part of genitalia : *T. ignita* Walker.

Not projecting more than half as far as clavate 10th segment 10.

10. [9.] Apical projection of gonopod subapically bent medially at about 45°: *T. marginata* Sibley.

Not so, almost straight : *T. m. tarda* n. ssp.

Original description: -

Holotype ♂, "Toronto, Ont., 26 - vi - '26, L.J.Milne." in the author's collection; 28 paratype ♂♂ from various localities in N.J., N.Y., Ariz., B.C., D.C., and New England; 4 specimens in the Can. Nat. Coll., 5 in the Mus. Comp. Zool., "Type 19547," and 5 in the Amer. Mus. N. H. One of these, from D.C., is labelled "Type 10974," of *T. ignita* Hagen nec Walker.

11. [1.] Fore wing costa notched at stigma, allowing wing to fold medio-ventrally in repose; ♂ 9th segment with a lamellar median ventral projection of diverse form; ♀ with large lateral anal valves; usually black species

- usually holding the bushy-hairy maxillary palpi in advance: *Mystacides* Latreille . 12.
 Not as above 14.
12. [11.] Western species; ♂ 9th segment median ventral process short, bifid, V-form: *M. alafimbriata* Hill-Griff.
 Eastern species; ♂ not as above 13.
13. [12.] Wings blue-black, with only jet hair; ♂ mid-ventral genital process bifid, long, U-shaped:
M. sepulchralis Walker.
 Wings black with golden hair; ♂ genital process short, scarcely emarginate, I-shaped:
M. longicornis (L.) *interjecta* (Bks.) 13a.
- Key to the color forms of *Mystacides* l. *interjecta* -
- a. [13.] Fore wings transversely banded with black hair:
M. l. interjecta form *canadensis* Banks.
 a. No black bands on fore wing: *M. l. interjecta* s.str.
14. [11.] Venation obsolete in anterior half of hind wings; spurs 0, 2, 2; slim, pale species *Leptocella* Banks. 15.
 Venation not obsolete as above; usually darker, stouter species 16.
15. [14.] Wings subhyaline yellowish, with yellow hair, and about 30 black dots on veins and membrane:
L. pavida (Hagen.)
 Not so *L. albida* (Walker). 15a.

- Key to the color forms of *Leptocella* albida -
- a. [15.] Fore wings with 3 - 4 conspicuous black spots at anal angle, and transverse dark bands, sometimes fused;
 b. Transverse bands yellowish - form *exquisita* Walker.
 b. Transverse bands dark grayish - form *Piffardii* M'L.
 a. Not as above;
 c. Only dark brown hair on fore wings; in abraded specimens stigma shows up darkest- form *stigmatica* Banks.
 c. Some white hair on wings; stigma not as above;
 d. White hair restricted to cell-centers - form *texana* Banks.
 d. Not so;
 e. Patches of black hair at least along fore wing hind margin;
 f. Fore wing veins with a series of quadrate patches of brown

- hair, otherwise gray, veins somewhat dark- f. *intervena* Bks.
- f. Veins pale, with only scattered small blackish spots, hair elsewhere white : form *Uwarowii* (Kol.)
- e. Fore wing hair unicolorous, veins pale or dark;
- g. Fore wing veins noticeably darker than membrane;
- h. Thorax blackish, wings gray - form *albida* s. str.
- h. Thorax brown, wings yellowish - form *exilis* Banks.
- g. Fore wing veins not darker than membrane;
- i. Body brown, wings yellowish - form *coloradensis* Banks.
- i. Not so;
- j. Length of fore wing over 9 mm., r and r-m at right angles to R and M, the anastomosis little disjointed - form *candida* Hagen.
- j. Length of fore wing less than 8 mm., anastomosis disjointed and oblique - form *minuta* Banks.
16. [14.] Two protibial spurs; M1 free in ♀, but not in ♂ fore wing, i.e. ♀ with forks I, III, V, ♂ without III: *Athripsodes* Billberg ... 17.
- One or no protibial spur; venation not sexually dimorphic; mostly small species 30.
17. [16] Fore wing black with scattered white scales 18.
- Fore wing without scales 19.
18. [17.] Robust species, ♂ eyes very large: *A. submaculus* (Wlk.)
- Slender, *Mystacides*-like; ♂ eyes normal: *A. albstictus* (Hagen.)
19. [17.] Caudo-ventral process of ♂ genitalia as long as any part; last ♀ sternite with 3 shallow notches, the anal valves narrow, apically approximate 20.
- Not as above 21.
20. [19.] Caudo-ventral process of ♂ U-shaped; fore wing over 9 mm. long, medium brown : *A. ancylus* (Vorhies.)
- Process L-shaped; fore wing paler brown, usually less than 7 mm. long : *A. flavus* (Banks.)
21. [19.] Males 22.
- Females 26.

30. [16.] M forked in fore wing 31.
 Not so *Æcetis* Curtis 34.
31. [30.] Hind wing venation very much reduced, only forks I
 and V remaining; extremely small species, pale fore
 wing not over 3 mm. long: *Setodina* Banks.
 Not as above: 32.
32. [31.] Male gonopods lamellar, hollowed internally, complete-
 ly obscuring inner structures from side view: ♀ with
 a pair of terminating narrow flaps: *Ymymia* n. gen.
 Sole N. A. species: *Y. americana* (Banks).
 Male gonopods slender, curved, long, not concealing
 the other genitalic parts: *Leptocerus* Leach. 33.
33. [32.] Wings yellow with white dots; ♂ gonopods reaching no
 farther caudad than 10th tergite: *L. guttatus* (Bks.)
 Wings brown with white spots; ♂ gonopod almost twice
 length of 10th tergite: *L. incertus* (Walker.)
34. [30.] Large, pale species; fore wing anastomosis scarcely dis-
 jointed, r in line with r-m ♂ gonopods lamellar, con-
 cealing inner genitalic parts: *Æcetis* s. str.
 Sole N. A. form: *O. ochracea* Curtis *carri* n.ssp.

Original description: -

Holotype ♂ and allotype ♀, "Tilley, Alta., 24-vi-'33, F.S.Carr;" 10 ♂ ♂
 13 ♀ ♀ paratypes, from many localities in Man., Sask., Alta., and Wyo.,
 5 in the Mus. Comp. Zool., "Type 19562," and 4 in the Can. Nat. Coll.
 Differs from the typical subspecies in proportions of genitalic characters.
 Length of fore wing 10.5 - 14 mm. Named in appreciation of the many
 contributions made by Mr. Carr to the author's series.

Smaller, usually brownish species; fore wing anastom-
 osis often disjointed or oblique: r never in line with
 r-m 35.

35. [34.] In hind wings, r-m at or before fork of M; ♂ gonopods
 abbreviated claspers: *Friga* n.subg. 36.
 In hind wings, r-m well beyond forking of M 38.

36. [35.] Fore wing anastomosis oblique; small, pale species:
O. osteni n. sp.

Original description: -

Holotype ♂ and allotype ♀, "Alexandria Bay, N.Y., Aug., O. Sacken;" "Type 19561," in the Mus. Comp. Zool., 30 ♂♂, 24 ♀♀ paratypes, from many localities in Mass., P.Q., Ont., Va., and N.J.; 4 in the Can. Nat. Coll., 25 in the M. C. Z., 2 in the Amer. Mus. N.H., the rest with the author. Length of fore wing 5 - 8 mm. Named in honor of Baron Osten-Sacken.

Not so 37.

37. [36.] In fore wings, m-cu beyond r-m; small:

O. immobilis (Hagen.)

Not as above: *O. inconspicua* (Wlk.)

38. [35.] Gonopods of ♂ thin, lamellar; fore wing membrane with dark spots in the angles of some vein forks:

subg. *Cetodes* Ulm. 39.

Not as above 40.

39. [38.] Small, transcontinental, yellowish brown species:

O. avara (Banks.)

Large, Californian, dark brown species:

O. disjuncta (Banks.)

40. [38.] Gonopods very short, superior appendages elongate:

subgenus *Quaria* n. subg.

Sole N. A. species: *O. scala* n. sp.

Original description: -

Holotype ♂, "Del. Water Gap, Md.," "Type 19563," in the M.C.Z., paratype ♂ "N.C.," in the author's collection, and a ♂ in the Amer. Mus. N.H., from Lakehurst, N.J. Length of fore wing 6 mm.

Gonopods attenuate claspers; membrane not with dark spots : subg. *Yrula* n. subg. 41.

41. [40.] Tufts of blackish hair over some fore wing forks in the angle formed; r there usually shorter than r-m:

O. fumosa (Banks.)

No hairy tufts; r equal to r-m 42.

42. [41.] In fore wings, m-cu at right angles to Cu and M:

O. persimilis (Banks.)

Fore wing m-cu oblique: *O. cinerascens* (Hagen.)

Notes :

1. Of *Triænodes*, more than one hundred ♀♀ specimens have been studied with no resultant classification; perhaps further work on longer series will yet reveal suitable characters.
2. There seems to be no reason for considering separate the color forms of *Mystacides l. interjecta* or *Leptocella albida*. The characters by use of which the various variations are separated here will not hold for more than ninety per cent of the several thousand specimens examined; these ten per cent are intergrades in structure and color. It would be interesting to know that œcological barriers exist between them; date of emergence and geographical distribution offer no solution to this problem.
3. Genus *Leptocerus* is one of two validly erected by Leach in 1815, (the other is *Limnephilus*,) and is based upon *Phryganea interrupta* Fab. Since Fabricius' species is considered congeneric with *S. punctella* Rambur, (synonym of *P. viridis* Fourcroy), here designated type of *Setodes*, and not with *P. nigronervosus* DeG., type of *Leptocerus* auctt. nec Leach. or with *P. albifrons* L., here elected type of *Athripsodes* Billberg, an extensive shift in generic names is necessary.

Check-list of N. A. species of LEPTOCERIDÆ .

(Since new critical treatment has been accorded only the N. A. forms in the present studies, and as these constitute such a small percentage of descript leptocerid species, it does not seem advisable to extend this paper with a long list of names whose validity has not yet concerned the author. Use of bold-face Gothic type for N.A. categories has been suspended as unnecessary).

Athripsodes Billb., '20.

1. *albostictus* Hg.'61.

punctatus Bks. '94.

2. *ancylus* Vor., '09.

3. *annulicornis* Stph.

a. *mentiens* Wlk., '52.

lugens Hagen, *ibid.*

dilutus Hagen, '61.

recurvatus Bk., '08.

retactus Bks., '14.

futilis Banks., '14.

4. *flavus* Banks, '04.

5. *floridanus* Bk., '03.

6. *perplexus* McL.

a. *nordus* Milne, p.15.

7. *resurgens* Wlk.'52.

variegatus Hag., *id.*

angustus Bks., '14.

8. *submaculus* Wlk.

9. *tarsipunctatus* Vor

10. *transversus* Hg. *id.*

maculatus Bks.'99.

inornatus Bks., '14.

Leptocella Banks, '99.
 11. *albida* Walker, id.
 nivea Hagen, ibid.
a candida Hagen, id.
b coloradensis Bk., '99.
c exilis Banks., '05.
 gracilis Bks., '04.
d exquisita Wlk., id.
e intervena Bks., '14.
f minuta Bks., '00.
g Piffardii M'L., '63.
h stigmatica Bks., '14.
 stigmatica Nav., '17.
i texana Bks., '05.
j Uwarowii Kol., '59.
 2. *pavida* Hag., ibid.
 Leptocerus Leach '15.
 13. *guttatus* Bks., '00.
 autumnalis Bks., '07.
 4. *incertus* Wlk., id.
 vernalis Bks., '07.
 Mystacides Latr., '25.
 15. *alafimbriata* Hill-
 G., '12.
 6. *longicornis* L.
 a. interjecta Bk., '14.
a canadensis Bks., '24.
 7. *sepulchralis* Wlk.
 Cæcetes McL., 1877.
a. Friga Milne, p. 16.
 18. *immobilis* Hag., id.
 Genotype here set
 9. *inconspicua* Wlk.
 20. *osteni* Milne, p. 17.
b. Cæcetes s.str.

21. *ochracea* Curt.
 a. carri Milne, p. 16.
c. Cæcetodes Ulm., '07.
 2. *avara* Bks., '95.
 Genotype here set
 3. *disjuncta* Bks., '20.
d. Quaria Milne, p. 17.
 4. *scala* Milne, p. 17.
 Haplotype
e. Yrula Milne, p. 17.
 5. *cinerascens* Hag.
 6. *fumosa* Bks., '99.
 Genotype here set
 7. *persimilis* Bks., '07.
 Setodina Bks., '07.
 8. *parva* Bks., '07.

Triænodes M'L., '65.
 29. *borealis* ♀ Bks., '00.
 30. *dentata* Bks., '14.
 1. *flavescens* Bk., '00.
 2. *helo* Milne, p. 12.
 3. *ignita* Walk., ibid.
 4. *injusta* Hag., ibid.
 5. *marginata* Sib., '26.
 a. tarda Milne, p. 12.
 Ylodes Milne, p. 11.
 36. *frontalis* Bks., '07.
 7. *grisea* Bks., '99.
 Genotype here set
 Ymymia Milne, p. 16.
 38. *americana* Bks.,
 '99.
 floridana Bks., '05.
 grandis Bks., '07.
 Haplotype

Errata :

Page 5, line 9, for ♂ read ♀; page 16, line 2, for Curtis read McLachlan; same page, after line 5, insert "Haplotype: *S. parva* (Bks.)"

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Caddis Flies

[over]



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TRICHOPTERA, 2

by Lorus J. Milne

The preceding paper in this series of privately printed abstracts was based upon a study of about 11,750 specimens, 1,100 in Phryganeidæ, 200 in Molannidæ, 3,700 in Leptoceridæ exclusive of *Leptocella* and *Oecetis*, 4,650 in the former, 2,100 in the latter. The present article deals only with Limnephilidæ and summarizes the decisions formed after a study of some 4,600 specimens, of which a quarter represented the forty species of *Limnephilus*.

Further material in the previously-treated families has undergone critical examination, adding little to the previous knowledge, but provided a third specimen of the *Triaenodes* keyed out in couplet 7.5 on p.12.¹ This is a ♂ in the author's collection, from near New Bedford, Mass., 13-vii-'34. It is here designated holotype of *T. aba* n. sp., therein adequately characterized. The ♂ without data in the Museum of Comparative Zoölogy collection may be a New England specimen but it does not seem wise to give it paratypic rank. Doctor Betten's specimen has not been studied by the author.

Six names hitherto used in Limnephilidæ are incertæ sedis at present; these are:—*Apatania groenlandica* Kolbe [1912], type in the Berlin Mus.; *A. hirtipes* (Curtis) [1824], type supposedly in the British Museum; *Halesus indicans* Walker [1852], type supposedly in the Br. Mus.; *Limnephilus femoralis* Kirby, [1835], type supposedly in the Br. Mus.; *L. partitus* Walker [1852], ♀ type in the Br. Mus. (Mr. Banks' notes on this specimen are insufficient to

¹ "Studies in North American Trichoptera, 1," 1934 (L. J. Milne, Cambridge, Mass.)

1053608

tie it to any one N. A. species); *L. sericeus* Say [1824], type lost.

The following five species from Alaska and Greenland have not been recognized among the specimens before the author; the identity of some of them would be worth checking:—*Grammotaulius sibiricus* McL., *Limnephilus miser* McL. (see notes, p.47), *L. griseus* L., *Apatania arctica* Boh. and *A. mongolica* Mart. These unstudied forms are not keyed in the following.

It has not been found practicable to provide a complete specific table to *Limnephilus* since the genitalia show the only satisfactory characters, and these are so complex and sex-limited that a key would be artificial and difficult to use;² the other genera are not so complex; many have been restricted or broadened in an attempt to provide a natural grouping. A check-list of North American species is appended to show the new synonymy.

Key to the North American species of LIMNEPHILIDAE

1. Fork 3 absent in hind wings.....2
 Fork 3 present there.....7
2. [1.] No wart between ocelli and posterior warts; venation
 not sexually dimorphic: *Oligophlebodes* Ulmer 3
 A distinct wart between ocelli and posterior warts;
 venation sexually dimorphic; mesotibial spurs 2–
 3, metatibial spurs 2–4: *Neophylax* McLachlan 4

² Keys based upon comprehensive illustrations of the European species of *Limnephilus* have been published [Ulmer, G., Trichoptera in Brauer's "Die Süßwasserfauna Deutschlands," 5–6; 1909 (G. Fischer, Jena), p.152; Esben-Petersen, P. Vaarfluer in "Danmarks Fauna," 19; 1916, (G. Gad, København), p. 152; and Мартынов, А. В., Ручейники in Н.Н.Богданов-Катков's "Практическая Энтомология," 5; 1924 (Государственное Издательство, Ленинград), p. 245].

3. [2.] Brown on fore wing confined to a dark streak in cells R_5 , C, at anal angle and basally on hind margin; smaller species:

O. sigma n.sp.

Holotype ♂ "Parowan Cañon, Iron Co., Ut., 24-vii-'19, T. Spaulding;" allotype ♀, 6 ♂♂ 7 ♀♀, same data as holotype, or same but 16-vii-'19, or "Gallinas Cañon, N. Mex., Os-lar." Holo- and allotype and half of the paratypes in the M. C. Z., "Type 21031," 7 paratypes in the author's collection. Fore wing length ♂ 6 - 7.5, ♀ 7 - 8 mm.

Brown on fore wings on anastomosis, Sc and Cua, apically in cells Sc, R_3 , R_4 , Cua1, Cua2, covering most of cells R_5 , M_{1+2} , M_{3+4} , and midway between anastomosis and apex in cells R_1 to R_3 ; larger species:

O. minuta (Bks.)

4. [2.] Spurs 1,3,4; wings dark grayish brown:

N. rickeri n.sp.

Holotype ♂, allotype ♀, 4 ♂♂ 14 ♀♀ paratypes "Cultus L., B.C., 12-x-'33, W.E.Ricker," or same dataa but 2-x-'33, 2, 7, 24-xi-'33; all but 1 ♂ 1 ♀ paratype in the author's collection, these in the M.C.Z., "Type 21029;" also 1 ♂ in the Canadian National Collection "Olivier, B.C., 23-ix, C.B.D.Garrett." Named in honor of the author's friend, William E. Ricker.

Spurs on mesotibia 2 - 3, metatibia 2 - 4; wings brownish yellow.....5

5. [4.] Fore wing with dark spot on end of vein M_1 , surrounded by a pale area; much of wing disc pale:

N. ornatus Bks.

Not so.....6

Spurs mentioned but one each; fore wing pictured blackish brown on hyaline:

G. areolaris (Wlk.)

Spurs mentioned three each; fore wing with longitudinal silvery stripes: *G. ullus* n.sp.

Holotype ♂, allotype ♀, 2 ♀♀ paratypes "Wellington, B.C., 17-x-'33," 1 ♀ each "Vancouver, B.C., 13-iv-'07, R.V. Harvey;" "Olympia, Wash.," "Agassiz, B.C., 27-iv-'17, W.R. Anderson;" "Fraser R., B.C., 6-xi-'33, W.E. Ricker;" "Mt. side west of Columbia Nat. Forestry Nursery, 12 mi. NW. of Carson, Wyo., 21-x-'18, A.C. Burrill; swept from blackberry vines, &c." The Vancouver specimen is in the M.C.Z., "Type 21023;" two topotypes in the Can. Nat. Collection; holo- and allotype and remaining paratypes in the author's collection. Fore wing length, ♂ 18.5 mm., ♀ 14 - 22 mm.

13. [12.] Fore wing length 8.5 - 9.5 mm., membrane scarcely maculate; outer margin evenly rounded or truncate: *G. canadensis* (Bks.)

Fore wing length 12 - 25 mm., membrane usually with silvery stripes, the outer margin usually emarginate.....14

14. [13.] Fore wing with a silvery stripe in cells R_s , R_5 and basally in M_1 15

No stripe as above; white flecks in distal end of apical cells, in base of cells R_4 , R_5 and M_1 and two in thyridial cell, one apically, one midway: *G. irroratus* (Fab.)

15. [14.] Fore wings much excised on outer margin; brown color of wing evenly distributed, the stigma very dark: *G. bellus* (Bks.)

Fore wing little or not excised; brown color chiefly in minute flecks on membrane; stigma no darker brown than brown stripe on hind margin of silvery streak in cell R_5 :

G. pritus n.sp.

Holotype ♂, "Banff, Alta., 25-x, on snow, Sanson;" in the M. C. Z., "Type 21022." Length of fore wing 19.5 mm.

16. [11.] Spurs 1,2,2; face with appressed long dense yellow hair: *A. nigra* (Wlk.)

Spurs 1,2,4..... 17

17. [16.] In ♂, parameres with a definite, recurved apex; gonopod second segment not bent more than 90° ; ♀ distinct only on internal characters: *A. shoshone* (Bks.)

In ♂, parameres almost straight, gonopod second segment hooked: *A. stigmatella* (Zett.)

18. [10.] Cheek with a long sharp prominent spine below; first apical cell extending a long way back on discal; hind wing discal thrice as long as its pedicel; spurs 1,3,4: *Carborius* Navas Sole N. A. species: *C. punctatissimus* (Wlk.)

No cheek spines as above; hind wing discal cell shorter 19

19. [18.] Hind wing Sc joined to R_1 by a cross vein near tip; vertex convex, posterior warts reduced; large species; fore wing veins white, bordered with dark brown: *Astenophylax* Ulmer Sole N.A. species: *A. argus* (Harr.)

Hind wing Sc not joined to R_1 ; vertex not specially convex 20

20. [19.] Vertex, part of thorax and fore wings with dense

appressed hair; basal cross veins very weak;
 fore wings not granulate, with a median
 silvery stripe: *Hesperophylax* Banks 21
 Vertex not with dense appressed hair 22

21. [20.] Fore femora in ♂ with a scabrous patch of short
 slim spines on medial side of mid-ventral
 line in basal two-thirds; silvery patches in
 fore wing cells R_4 , R_5 and M_1 extending
 toward apex scarcely beyond mid-point of
 cells; spurs usually 1,3,4: *H. consimilis* (Bks.)
 Fore femora in ♂ without such a scabrous patch;
 silvery areas in fore wing cells R_4 and R_5
 extending almost or quite to margin; spurs
 more variable: *H. designata* (Wlk.)⁸

⁸ Key to the Color Phases⁴ of *H. designata* (Wlk.)

- a. Large, distinctly-marked western race; ♂ superior ap-
 pendages subapically deeply emarginate above; ♀ sup-
 erior appendages not more than twice as long as broad,
 subquadrate; spurs 1,2,4 or 1,3,4: form *magna* Bks.
- a. Mostly smaller specimens, distribution various; ♂ sup-
 erior appendages not or scarcely emarginate above,
 never more than very broadly so; ♀ superior append-
 ages more than thrice as long as broad, subacuminate
 apically;
- b. Expanse usually over 35 mm.; fore wings hairy,
 strongly marked, the streaks of white hair in apical
 cells and cell R_s very distinct; spurs usually 1,3,3,
 sometimes 1,3,4: form *occidentalis* (Bks.)
- b. Expanse not over 35 mm.; wings not densely hairy,
 the white streaks not specially silvery or prominent;
 spurs 1,2,2 on all examined;
- c. Melanistic phase, body blackish brown, wings very
 dark brown, the sub-hyaline pattern distinct but not
 silvery: form *alascensis* (Bks.)
- c. Not melanistic; body light brown; fore wings pale

22. [20.] Fore distitarsus spiny below; bristles on veins scarcely longer than those on membrane:
Grammotaulius Kolenati 23
 Not as above.....24
23. [22.] Species inhabiting Canada and Labrador, especially the northern and mountainous portions; ♂ genitalia little visible from behind because of closely-applied superior appendages; ♀ last tergite not with a pair of rod-like projections; fore wings less distinctly marked: *G. interrogationis* (Zett.)
 Species inhabiting the western U.S.A. and southern and low localities in B.C.; ♂ genitalia visible from behind since superior appendages are not closely applied but disclose them; ♀ with a pair of rod-like projections on last tergite; fore wings more distinctly marked: *G. bettenii* Hill-Griffin.
24. [22.] Fore wing apical margin with several distinct emarginations; vertex without posterior warts,

brown, pattern not contrasting: form *designata* s.str.

⁴ The criterion for species separation which has been developed and followed by the author, may be formulated thus:— "Any two specimens which cannot be told apart other than by size when completely bleached and denuded, must not be considered different species until study of many more specimens and (or) knowledge of other metamorphic stages definitely proves such to be the case." Wherever enough variation was found to make species separation doubtful, the category of unknown significance has been keyed as a "color phase."

very flat covered with short curled hairs
which are sparse but uniformly scattered
on low elevations; fore wing costal margin
nearly straight; hind wing not deeply excised;
large species: *Glyphotaenius* Stephens

Sole N.A. species: *G. hostilis* Hagen.

Not as above25

25. [24.] Spurs 1,2,2; in ♂, fore basitarsus scarcely longer
than 2nd segment, protibial spur short and
black.....78

Not as above.....26

26. [25.] No prominent macrochæta behind or inward from
ocellus, although sometimes hairs much
smaller than macrochætæ; fore wing tip
rounded, not obliquely truncate.....27

At least one prominent macrochæta behind or
inward from each ocellus, about equal in
size to bristles of posterior warts; fore wing
tip usually obliquely truncate.....56

27. [26.] Hairs on fore wing membrane as long as those
on the veins; ♂ unknown, ♀ short winged
(fore wing length 4.5 mm.):

Psychoronia Banks

Sole species (one specimen known):

P. brevipennis (Bks.)

Not as above.....28

28. [27.] Hind wing discal cell not before forking of M;
fore wing membrane roughened; spurs 1,3,4:

Eustenace Banks 29

Hind wing discal cell plainly before fork of M.. 30

29. [28.] Fore wing veins scarcely darker than membrane;

base of cell R_5 there dark; ♂ intermediate
appendages acute, not flattened:

E. limbatus (McL.)

Fore wing veins notably darker than membrane;
base of cell R_5 there pale; ♂ intermediate
appendages flattened, obtuse:

E. gentilis (McL.)

30. [28.] Hind distitarsus usually with no spine below (the
only exception known is *Anisogamus atripennis*, with blackish wings, which some-
times has a spine) 31

Hind distitarsus usually with one or more spines
below (exceptions are *Stenophylax circularis*
and *divergens*, which have large yellowish
wings)..... 42

31. [30.] Spurs 1,2,2: *Ironoquia* Banks

Sole N.A. species: *I. parvula* (Bks.)

Spurs not as above..... 32

32. [31.] Three spurs on meso- and metatibiæ:

Drusus Stephens

Sole N.A. species: *D. virginicus* (Bks.)

Metatibiæ with four spurs 33

33. [32.] Anastomosis before end of Sc in fore wings,
apical cells thus very long:

Anisogamus McLachlan 34

Anastomosis beyond end of Sc in fore wings,
apical cells thus normal:

Algonquina Banks 38

34. [33.] Three mesotibial spurs 35

Two mesotibial spurs: *A. antennatus* (Bks.)

35. [34.] Blackish species, legs contrasting yellow; fore

- wing length over 12.5 mm. 36
- Brown species, legs little paler, never contrasting; fore wing length not over 14 mm. ... 37
36. [35.] Fore wing length 18 - 20 mm.; no yellowish dots on membrane but a good deal of dark hair; femora entirely yellow: *A. atripennis* Bks.
- Fore wing length 12.5 - 16 mm.; many yellowish dots on membrane and but little hair; femora mostly black, knees yellow:
A. edwardsi Bks.
37. [35.] Fore wings brownish gray, with a number of white spots in bases of all apical cells, in mid-subdiscal and mid-thyridial cells; stigma not noticeable: *A. costalis* (Bks.)
- Fore wings hyaline brownish yellow, stigmatic region slightly darker, but wings otherwise unmarked: *A. disjunctus* Bks.
38. [33] Fore wing length more than 12 mm.; ♂ maxillary palpi with segments two and three subequal, slender, cylindrical, punctulate, each twice as long as head: *A. centralis* (Bks.)
- Fore wing length less than 11 mm.; ♂ maxillary palpi with segments two and three together not twice as long as head, less cylindrical and slender, and not noticeably punctulate 39
39. [38.] Fore wings blackish, devoid of any pattern; hair on vertex black, body black 40
- Fore wings light brown, the veins darker, with a pattern of whitish dots or streaks; hair on vertex white..... 41
40. [39.] Sclerites over fore wing base with yellow hair; pronotal warts yellow, with much yellow

hair; last ♀ tergite having the bifurcations ending acutely: *A. pilosa* (Bks.)

Sclerites over fore wing base black with black hair; pronotal warts dark brown with black hair; last ♀ tergite having the bifurcations ending bluntly: *A. renoa* n.sp.

Holotype ♀, 5 paratype ♀♀, "Reno, Nev., '78, Morrison." Holotype and 2 paratypes in the M.C.Z., "Type 21026," others in the author's collection. Length of fore wing 7.5-8 mm.

41. [39.] Fore wing length to width ratio 10 : 3; opaque whitish dots over much of membrane, not fused to form uniform streaks in special cells: *A. parvula* (Bks.)

Fore wing length to width ratio 8 : 3; opaque whitish streaks in cells R_2 to R_5 , M_1 , Cu_{22} , apically in discal, subdiscal and thyridial: *A. minuscula* (Bks.)

42. [30.] Anterior boundary of fore wing discal cell nearly straight; smaller species with elongate wings: *Rhadicoleptus* Wallengren 43

Anterior boundary of fore wing discal cell concave; larger species with broad wings: *Stenophylax* Kolenati 44

43. [42.] Fore wings subhyaline whitish with dark veins and a brown "wash" in cells Sc, R_4 , apically in M, basally in M_{3+4} , Cu_2 and anals: *R. flavicollis* (Bks.)

Fore wings brownish with whitish subhyaline spots in the following cells:- basally in R_2 , R_3 , R_5 , M_1 , apically in cells R_{4+5} , M, R_5 , M_2 , M_{3+4} : *R. fumosus* (Bks.)

44. [42.] Fore wings strongly mottled with dark brown,

- light brown, and hyaline blotches; fore wing length usually over 21 mm.....45
- Fore wings without mottlings, usually less than 21 mm.....46
45. [44.] Mesothoracic strips yellow with yellow hair; ♂ intermediate appendages acute:
S. formosa (Bks.)
 Mesothoracic strips brown with whitish hair; ♂ intermediate appendages flattened, obtuse:
S. magnifica (Bks.)
46. [44.] Fore wing membrane speckled all over with brown raised dots: *S. scabripennis* (Rbr.)
 Not so47
47. [46.] Spurs 1,2,2: *S. subfasciata* (Say.)
 Three mesotibial spurs.....48
48. [47.] Vertex and anterior warts brown with brownish hair; postocular bristles black; fore wings brownish gray; ♂ ninth tergite neither thickened nor scabrous: *S. hesperus* (Bks.)
 Vertex and anterior warts yellow with yellow hair; postocular bristles pale49
49. [48.] Males50
 Females separable only on internal genitalic structures which require illustration for use and are hence beyond the scope of this paper.
50. [49.] Male eighth tergite thickened, sometimes quite scabrous above, genitalia with an acute bifurcate black-tipped median dorsal projection; spurs 1,3,4: *S. sonso* n.nom.
 for *Allegophylax subfasciatus* Carp. nec

(Say)⁵. Holotype ♂ "Bryson City, Deep Ck., Smoky Mts., N.C., 2,000', 27-viii-30, P. J. Darlington, Jr.," allotype ♀, "Newfound Gap, 5100', Smoky Mts., N.C. - Tenn., 1-ix-'30, N. Banks;" 3 ♂♂ 3 ♀♀ paratypes, same data as holo- and allotype, or "State Rd. to Newfound Gap, 3500', Tenn., 3-ix-'30, F.M.Carpenter." Holotype, allotype, and two paratypes in the M. C. Z., "Type 21050;" remaining paratypes in the author's collection. Length of fore wing 17 - 19 mm.

No projection as above..... 51

51. [50.] Spurs 1,3,3; ♂ 8th tergite above bilobed, scabrous at least on lobe apices..... 52

Spurs 1,3,4; ♂ 8th tergite either not bilobed or not scabrous..... 54

52. [51.] Scabrous lobe apices about in line with lateral abdominal fold, approximate to each other exposing genitalia as through an 8:

S. guttifer (Wlk.)

Lobes not in line with lateral fold, more dorsad, genitalia seen as through an 0..... 53

53. [52.] Apex of ♂ gonopod bifurcate, the medial tooth acute, lateral spatulate: *S. circularis* (Prov.)

Apex of ♂ gonopod with a single medial acute tooth: *S. dan* (Sib.)

54. [51.] Ninth ♂ tergite medially truncate, rounded dorso-ventrad, scabrous: *S. divergens* (Wlk.)

Not as above..... 55

⁵ Carpenter, F. M., "Trichoptera from the Mountains of North Carolina and Tennessee," in *Psyche*, 40; 1933: p. 34.

55. [54.] Ninth ♂ tergite with lateral non-scabrous lobes, sharply curved dorso-caudad; gonopod apex sharp, bifid: *S. luculentus* Bett. — *S. stasta* n.sp. Holotype ♂, "Toronto, Ont., 9-ix-'31, C.S. Milne," allotype ♀, "Central Pa., 27-ix-'14," 4 ♂♂ 2 ♀♀ paratypes, "Valley of Black Mts., N.C., 17-20-ix-'06, W. Beutenmuller," "Black Mts., N.C., 1911 Exped.," 5 ♂♂ 1 ♀ "Tuxedo, N.Y., 17-ix-'28." Holo- and allotype and 3 ♂♂ 2 ♀♀ paratypes in the author's collection; 5 ♂♂ 1 ♀ in the Amer. Mus. N. H., 1 ♂ in the M.C.Z., "Type 20132." Fore wing length 17-20 mm.

Ninth ♂ tergite without lateral lobes; gonopod apex rounded, flattened: *S. flavata* (Bks.)

56. [26.] Hind distitarsus with one or more black spines below (? in *Goniotauius*) 70
Not so 57

57. [56.] Stigma of fore wing not coriaceous; first apical cell there broad at base, R_1 bent sharply at stigma, R_2 parallel with it, strongly bent away from wing margin distad of this 58
Stigma not especially prominent; R_1 and R_2 not as above 63

58. [57.] Spurs 1, 3, 3; membrane not much roughened: *Halesochila* Banks
Sole N.A. species: *H. taylori* Bks.
Spurs 1,2,2; membrane more or less granulate: *Chilostigma* McLachlan 59

59. [58.] Body robust, black; antennæ, legs to knees, and mouth parts black; fore wings either brown or marked with irregular whitish blotches:

C. praeteritum (Wlk.)

Body slender, brown to yellow, antennæ, legs and mouth parts paler; fore wings either brown or with definite longitudinal silvery streaks...60

60. [59] Brown pigment in points on fore wing, not evenly distributed as a "wash;" silvery streaks never very definite in outline; stigma not reddish..... 61

Pigment in fore wings continuous; silvery streaks in cells R_s , R_5 and M_1 very definite; stigma reddish: *C. subboreale* Bks.

61. [60] Pigmentation of fore wings reduced in cells C, Sc, R_1 , R_{2+3} , basally in R_2 , anteriorly in R_5 , and in R_5 , giving indistinct pale streaks; blackish patches on vertex just mediad of lateral ocelli: *C. alascense* Bks.

Never any indication of streaks in fore wings...62

62. [61] Larger species; ♂ gonopods apically elongate; ♂ intermediate appendages brown, convergent; 8th ♂ tergite with a submedian scabrous patch on each side; ♀ last tergite with many black bristles and no subanal shelf:

C. difficile (Wlk.)

Smaller species; ♂ gonopods apically obliquely emarginate without elongation; ♂ intermediate appendages black, parallel, punctulate; 8th ♂ tergite scabrous all across; ♀ last tergite without noticeable black bristles and with a broad conspicuous subanal shelf:

C. missum n.sp.

Holotype ♂, allotype ♀, 6 ♂♂ 3 ♀♀ paratypes "Readville, Mass., 9-xi, N.Banks;" 2 ♂♂ "Sea Cliff, L.I., N.Y., 17-xi; 1 ♂ "Otto, N.Y., 25-x-'02; 1 ♂ 2 ♀♀ "Washington, D.C.;"

1 ♂ "Falls Church, Va., 24-x-'02;" 1 ♂ 1 ♀ "Harrisburg, Pa., 6-xi;" 1 ♂ "Monadnock, N.H., S.H.Scutt;" 1 ♂ "Ithaca, N.Y., 17-x-'02;" 1 ♂ 2 ♀♀ "Forest Hills, Mass., 31-x-'04, A.P.Morse;" 1 ♂ "Mass., 1860, Uhler;" 1 ♀ "Mass., 28-x, Sanborn;" and 4 ♂♂ "Coll. A.P.Morse." Holo- allo- and 16 paratypes in the M.C.Z., "Type 21049;" the remaining 16 paratypes in the author's collection. Fore wing length, ♂ 10-12 mm., ♀ 11-13 mm.

63. [57] A large tuft of long hairs at anal base of fore wings; outer fringe on coxa 1 longer than width of coxa; antennæ strongly crenulate beneath; ocelli large; tibia 1 densely spined to base; bristles on veins not prominent; discal cell in hind wings reaches long before forking of median vein; large species:

Dicosmoecus Ulmer 64

Hair at anal base shorter, less dense, and that on anterior coxæ short; bristles on veins usually distinct; smaller species.....66

64. [63.] Fore wing length 21-27 mm.....65
Fore wing length 13-22 mm.: *D. unicolor* (Bks.)

65. [64.] Feet yellow: *D. gilvipes* (Hag.)
Feet black: *D. atripes* (Hag.)

66. [63,74.] Spurs 1,2,4 or 1,3,4; first fork extending along way on discal cell: *Ecclisomyia* Banks. 67
Spurs 1, 3, 3; first fork scarcely back on discal cell: *Acronopsyche* Banks
Sole N.A. species: *A. occidentalis* (Bks.)

67. [66.] Spurs 1,3,4: *E. simulata* (Bks.)
Spurs 1,2,4.....68

68. [67.] Fore wing over 12 mm. long69
 Fore wing length not over 9 mm.:
E. maculosa (Bks.)
69. [68.] Male superior appendages large, projecting dorsad;
 gonopods with a pair of large curved black
 spines on medial surface: *E. conspersa* (Bks.)
 Male superior appendages small, directed mediad
 and ventrad; gonopods with no curved black
 spines: *E. scylla* n.sp.
 Holotype ♂ "Cultus L., B.C., 12-viii-'34, W.E.
 Ricker," in the author's collection; 4 ♂♂ para-
 types, one same data as holotype, deposited
 in the M.C.Z., "Type 20130; "two" Hope Mts.,
 5,500 ft., 6-viii-'32, A. N. Gartrell;" one "Mt.
 Apex, Summerland, B.C., 29-vii-'31; the last two
 in the Canadian National Collection, others
 with the writer. Fore wing length 12-14 mm.
70. [56.] Anal cell of fore wings divided at base (2nd A
 present73
 Anal cell of fore wing not divided (2nd A absent),
 many basal veins obsolete; hind wing 4th
 apical cell broad; an ocellar macrochaeta;
 ♂ fore femora spiny below basally; spurs
 1, 3, 3: *Platycentropus* Ulmer 71
71. [70.] Fore length, over 16 mm.; a characteristic Y-shap-
 ed brown mark with fork over basal third
 of apical cells; basal half of subdiscal and
 thyridial cells brown: *P. maculipennis* (Kol.)
 Fore wing length not over 14 mm.; brown mark
 not as above; basal half of subdiscal and
 thyridial cells not noticeably darkened...72
72. [71.] Fore wing area between R_5 and anal angle and
 anastomosis rather uniformly brown except

for a hyaline patch in bases of M_1 and M_2 ;

P. amicus (Hag.)

Fore wing area mentioned above not uniformly dark, - either lightly clouded or hyaline:

P. indistinctus (Wlk.)

- | | | |
|-------------|---|----|
| 73. [70.] | Tibia 1 spined to base..... | 76 |
| | Not so..... | 57 |
| 74. [73.] | Pronotum large and prominent..... | 66 |
| | Not so..... | 75 |
| 75. [74.] | Male fore basitarsus not or scarcely longer than
second segment; ♀ genitalia an elongated
tube | 76 |
| | Male fore basitarsus twice as long as second
segment; ♂ fore femora usually with out an
elongate pile of blackish spines or bristles
below basally; ♀ genitalia not as above.. | 99 |
| 76. [75,73] | Male fore basitarsus almost twice as long as
second segment; ♂ superior and intermediate
genitalic appendages heavy, projecting:
<i>Arctoeicia</i> McLachlan | 77 |
| | Male fore basitarsus not or scarcely longer than
second segment; ♂ superior appendages not
heavy, or projecting..... | 80 |
| 77. [75.] | Bristle-bearing punctures scattered over meso-
notum, not leaving a bare space between
distinct longitudinal bands..... | 78 |
| | Bristle-bearing punctures arranged in two sub-
median longitudinal strips separated by a
glabrous one..... | 79 |
| 78. [77.] | Fore wings long and narrow, length to width ratio
as 13:3, the apex sharp, the margin thence | |

rounding regularly into hind margin, the membrane entirely immaculate; hind wing cell M_1 stalked: *A. gracilis* (Bks.)

Fore wing broad, ratio of length to width as 12:4, a distinct angle between apical and hind margins, veins darker than speckled membrane; hind wing cell M_1 not pedicellate: *A. consocia* (Wlk.)

79. [77.] Male intermediate appendages thick flat plates, evenly rounded posteriorly, held in a dorso-ventral plane; fore wings yellowish with dark veins and a brownish mark in discal cell; antennæ blackish: *A. ozburni* n.sp. Holotype ♂, allotype ♀, 2 ♂♂ 4 ♀♀ paratypes "Guelph, Ont., 27-vi-'29, R.H.Ozburn;" 1 ♂ same data but 25-vii-'27, 1 ♂ same but 7-vii-'30, 1 ♀ same but 15-vi-'30; 4 ♂♂ 1 ♀ "Aweme, Man., 13-vi-'25, R.D.Bird;" 1 ♂ "Knowlton, P.Q., 29-vi-'30, L.J.Milne," 1 ♂ same place but 9-vii-'27, G.S.Walley; 2 ♂♂ "Cornwall, Ont., 29-vi-'25." Holo- allo- 15 paratypes in the author's collection; 1 ♂ in the M.C.Z., "Type 20120;" 4 ♂♂ 1 ♀ in the Can. Nat. Collection. Fore wing length, ♂ 8-10 mm., ♀ 9-11 mm.

Male intermediate appendages posteriorly crescentic, concave dorsad; antennæ yellowish; fore wings yellowish brown with brown markings scattered all over: *A. brevipennis* (Bks.)

80. [76.] Spurs 1, 2, 2; small pale species: *Zaporota* Banks. Sole N.A. species: *Z. pallens* (Bks.)
Spurs 1, 3, 4 or 1, 2, 3.....81

81. [80.] Fore wings longer and narrower, length to width ratio about 13:3, discal cell normal, length of

R_{4+5} compared to R_4 not more than as 5 : 4; mostly brown species, the apex of fore wing not especially rounded: *Anabolina* Banks 82

Fore wings shorter and narrower, length to width ratio about 11:13, discal cell long, length of R_{4+5} compared to R_4 more than as 6 : 4; mostly yellow species; the apex of fore wing usually rounded: *Colpotaulius* Kol. 88

82. [81.] Spurs 1, 2, 3.....83
 Spurs 1, 3, 4.....84

83. [82.] Male 8th tergite scabrous; ♀ last tergite emarginate in a broad open U which curves regularly into lateral margins, not impressed above; a slightly larger species: *A litha* n.sp. Holotype ♂, paratype ♂ "Boulder, Colo., 19-v, Cockerell;" allotype ♀ paratype ♂ and ♀ "Las Vegas, N. Mex., 17-v, Cockerell;" 4 other paratypes, 1 ♂ "Ft. Davis, Tex., 5,000 ft., 1-15-xi-'27, Mrs. O.C. Poling; 1 ♀ "Parmerlee, Ariz., Biedermann;" 2 ♀♀ "Regnier, Colo., 6-9-vi-'19." Holo- allo- and 3 paratypes in the M.C.Z., "Type 20120;" 1 ♀ paratype in the Amer. Mus. N. H.; remaining 4 paratypes in the author's collection. Fore wing length, ♂ 12 - 13 mm., ♀ 13 - 18 mm.

Male 8th tergite not scabrous; ♀ last tergite emarginate in a narrow deep U not curving into lateral margins, the sclerite impressed rather deeply above; a slightly smaller species: *A. assimilis* (Bks.)

84. [82.] Male fore basitarsus as long as second segment; ♀ fore basitarsus a third longer than second segment; ♀ genitalia not a projecting tube..85
 Male fore basitarsus not more than three-fifths

- as long as second segment.....86
85. [84.] Male superior appendages posteriorly an uniform thin black crescent with acute tips, one median, the other latero-ventral; ♀ last tergite a flattened plate with V-shaped emargination and nearly parallel sides with thin distinct margins: *A. diversa* (Bks.)
 Male superior appendages posteriorly flattened, several lobed, black, shining, without acute tips; ♀ unknown: *A. producta* (Bks.)
86. [84.] Male fore basitarsus slightly more than half as long as second segment; ♀ fore basitarsus over twice as long as second segment; wings with a slight pattern: *A. spinata* (Bks.)
 Male fore basitarsus not more than a third as long as second segment; ♀ genitalia a projecting tube.....87
87. [86.] Male gonopod apex projecting posteriorly, black, shining, glabrous, with a minute tooth sub-apically above; ♀ last tergite jet-black, with median emargination: *A. canadensis* (Bks.)
 Male gonopod apex not projecting posteriorly, yellow, hairy, without tooth above; ♀ last tergite yellow, with no median emargination: *A. submonilifer* (Wlk.)
88. [81.] Fore femora with six or seven black spines on medial surface; ♂ protibial spur yellow, basitarsus as long as second segment: *C. quaeris* n.sp.
 Holotype ♂, allotype ♀, 2 ♂♂ 1 ♀ paratype "Quesnel L., B. C., 27-viii, Crotch;" 1 ♂ paratype "Winnipeg, Man., 20-vi-'11;" 1 ♂ paratype "Florissant, Colo., 26-vii, Cockerell;"

9 ♂♂ 5 ♀♀ paratypes "Aweme, Man., 12-vii-'25, R.D.Bird;" 2 ♂♂ same data but 13-vii-'25, 5 ♂♂ 3 ♀♀ same place but 21-viii-'25, N.Criddle." Holo- allo- and 5 paratypes in the M.C.Z., "Type 21024;" 8 ♂♂ 4 ♀♀ in the Can. Nat. Collection; remaining 8 ♂♂ 5 ♀♀ in the author's collection. Fore wing length, ♂ 8-10 mm., ♀ 9-11 mm.

Neither of the above89

89. [88.] Eighth ♂ tergite scabrous above; ♀ with a pair of deflected tab-like appendages on last tergite: *C. rhaeus* n.sp.
 Holotype ♂, allotype ♀, 1 ♂ 3 ♀♀ paratypes "Guelph, Ont., 13-vii-'22, R.H.Ozburn," and same data but 27-vi, 22-vii-'29, 20-vi, 25-vi-'30 respectively; 1 ♂ "Cypress Hills, Alta., 17-viii-'32, F.S.Carr;" 2 ♂♂ 6 ♀♀ "Aweme, Man., 13-vii-'25, R.D.Bird;" 2 ♂♂ "Saskatoon, Sask., 27-viii-'25, K.M.King;" 1 ♂ "Lethbridge, Alta., 22-viii-'13, E.H.Strickland;" 1 ♀ "Indian Head, Sask., 9-vii-'25, J. J. deGryse." Holo- allo- and 4 ♂♂ 6 ♀♀ paratypes in the author's collection, 1 ♀ deposited in the M.C.Z., "Type 21025;" 3 ♂♂ 3 ♀♀ in the Can. Nat. Collection. Fore wing length, ♂ 7-10 mm., ♀ 9-12 mm.

Eighth ♂ tergite not scabrous above.....90

90. [89.] Superior ♂ appendages strongly projecting; ♀ last tergite trifold: *C. minusculus* (Bks.)
 Not as above: *C. perpusillus* (Wlk.)

91. [75.] Hind wing 4th apical cell as broad basally as thrice its width distad: *Anabolia* Stephens 92
 Hind wing 4th apical cell narrowed basally: *Limnephilus* Leach 98

97. [96.] Male superior appendages with a distinct dorso-lateral corner which projects as far caudad as the dorso-medial corner, these appendages with their ventral extremities distant from each other; eastern race:

A. p. simplex (Bks.)

Male superior appendages with no dorso-lateral corner, the ventral extremities almost contiguous; western race: *A. p. planifrons* s.str.

98. [91.] Apical spines on fore femora and a number of those on the tibiae, yellow: *Limnephilus* s.str. 99
Not as above.....100

99. [98.] Eighth ♂ tergite not scabrous above:

extractus Wlk. and *morrisoni* Bks.

Not so, scabrous:

combinatus Wlk., *elongatus* Bks., *externus* Hag., *hageni* Bks., *luteolus* Bks., *macgillivrayi* Bks., *perjurus* Hag., *sanisoni* Bks., *stigma* Curt. race *sackeni* Bks., *sublunatus* Prov.

100. [98.] Small blackish species, lateral prolongations of ♂ 9th tergite laminae, flattened against genitalia, more or less concave posteriorly, usually broadly emarginate dorsally:

Goniotautilus Kol.

coloradensis Bks., *kennicotti* Bks., *pulchellus* Bks.

Not so.....101

101. [100.] Large species, fore wing length about 14 mm., pattern of whitish hyaline on one shade of brown; ♂ last tergite a broad heavily sclerotized emarginate plate dorsally; ♀ genitalia with a pair of lateral horn-like lobes.....102

Not so.....106

102. [101.] Ninth ♂ tergite with a median bifid projection which extends farther posteriorly than short superior appendages; ♀ superior appendages long narrow laminae, held parallel, closer together than two-thirds their length; ovipositor broad, conical, distinctly emarginate medially: *rho* n.sp.

Holotype ♂ "Olympia, Wash., Kincaid;" allotype ♀ "Victoria, B.C., 28-ix-'97;" 6 ♀♀ paratypes "Wellington, B.C., Bryant;" "B.C.;" "Bon Accord, B.C., 6-vi, Russell;" "Gulf of Georgia, B.C., A.Agassiz;" "Quesnel L., B.C., 27-viii, Crotch;" "Agassiz, B.C., 24-vii-'26, H.H.Ross." Holo- allo- and 2 paratypes in the M.C.Z., "Type 20127;" 3 paratypes in the author's collection, one in the Can. Nat. Collection. Length of fore wing, ♂ 22 mm., ♀ 18-21 mm.

Not so, superior appendages concealed by a heavily sclerotized smooth plate which is broad, blackened, medially emarginate in a variety of ways; ♀ not as above.....103

103. [102.] Median emargination of ♂ ninth tergite V-shaped, the apex of the V rather acute; ♀♀ as described below.....104

Median emargination of ♂ ninth tergite U-shaped; ♀♀ not known.....105

104. [103.] Posterior margin of ♂ ninth tergite almost in a straight transverse line, a rounded emargination at lateral angles; ♀ superior appendages curved, blunt, cylindric but distad decreasing in area of cross section, ovipositor narrow, slightly bifid apically, conical, without lateral teeth: *vastus* Hag.

Posterior margin of ♂ ninth tergite a wide-

open U with median notch, the lateral emarginations directed posteriorly; ♀ superior appendages acute apically, of irregularly decreasing area of cross section; ovipositor broad, with lateral projecting teeth: *gravidus* Hag.

105. [103.] Posterior margin of ♂ ninth tergite without sharp teeth, with a rounded postero-lateral emargination: *rillus* n.sp.
Holotype ♂ "Reno, Nev., 1878, Morrison;" in the M.C.Z., "Type 20128." Fore wing length 17 mm.

Posterior margin of ♂ ninth tergite with a number of sharp teeth, laterally with several acute emarginations: *oreus* n.sp.
Holotype ♂ "L. of the Woods, Klamath Co., Ore., 4500-7500 ft., 21-vi-'30, H.A.Scullen;" in the author's collection by courtesy of the Oregon Agric. Coll.

106. [101.] Male genitalia so far unknown:
bifidus Bks. and *concolor* Bks.
Not so.....107

107. [106.] Eighth ♂ tergite scabrous medially:
abbreviatus Bks., *argenteus* Bks., *despectus* Wlk.,
harrimani Bks., *infernalis* (Bks.), *moestus* Bks.,
nebulosus Kby., *occidentalis* Bks., *rohweri* Bks.,
sitchensis (Kol.), *stigma* Curt. race *indivisus* Wlk.
Not so:
clausa Bks., *cockerelli* Bks., *crassus* Bks., *kincaidi*
Bks., *nigriceps* Zett. race *forcipatus* Bks.,
ornatus Bks., *radiatus* Say, *roberti* Bks.

Notes:—

Doctor Cornelius Betten's long-awaited publication⁶ has been issued since the preceding pages were printed; it is indeed a useful summary of our knowledge of Trichoptera. Since it is feasible to correlate the two papers as far as they cover the same ground, it may be well to do so in conjunction with notes on the key herein presented. Two obvious discrepancies will be at once apparent from a comparison of the nomenclature there and in the present tabulation:— one is the more drastic synonymy which has been indicated by study of the type material and long series, the other a different decision as to the conspecificity of North American and European forms. Thus the writer has found specific differences in the genitalia of both sexes of *Limnephilus rhombicus* (L.) and *L. combinatus* (Wlk.) which satisfy him of their distinctness; the toothing of the superior appendages and the relative size and prominence of the intermediate appendages in the ♂ seem constantly different.

Dr. Betten quotes [p. 326.] *Limnephilus miser* McL. from "St. Martin's Falls, Albany R., Hudson's Bay." This is seemingly a transfer of the data of the holotype ♀ of *L. partitus* Wlk. on the evidence that Hagen wrote [1861, p. 261] *partitus* = *Phryganea trimaculata* (Zett.), and McLachlan [1880, p. viii] stated *trimaculatus* Hag. nec (Zett.) = *L. miser* McL. If McLachlan was correct, then his species must be a synonym of *L. partitus* Wlk.; if not, the citation of *L. miser* McL. from Hudson Bay is in error. The notes made on Walker's type in 1912 by Mr. Banks are not adequate to enable the author to settle

⁶ Betten, C., with B.L. Kjellgren, A.W. Orcutt and M.B. Davis, "The Caddis Flies or Trichoptera of New York State," Bull. N. Y. State Mus. 292, (Albany, N. Y.), Dec. 1934; 576 pp., 61 text figs., 67 pls.

this point. It would be interesting to know if the Greenland specimens recorded by Mosely are *miser* or *partitus*; this is the only N.A. record of *miser* unless the two names are synonomous.

It will be strange if *Limnephilus tersus* Bett. and *Drusinus uniformis* Bett. are not represented in the material studied by the writer, but at present he is unable to identify these names with any known species; the former will probably key out to couplet 107, part 1.

Rhizophylax seems an unnecessary name since its genotype fits fairly well in *Anabolina* Bks.; *Rheophylax* is also homonomic to a genus of Protozoa.

Many details in the appearance of *Psychoronia brevipennis* (based upon a single ♀, the sole specimen known) suggest that it is an aborted example; further material may show the truth.

According to investigations by Forsslund,⁷ genus *Apatania* Kol. was based upon a misidentification of *Phyganea vestita* Zett., his specimens being *Molanna angustata* Curt. Wallengren's *Apatelia* [haplotype *inornata*] is the first available synonym.

The characters suggested by Doctor Carpenter (see footnote to p. 34) for a possible new subgenus in *Neophylax* are too variable to be used even as specific features. A very long series of *N. concinnus* McL. collected in one locality on one date exhibit all the variation in wing venation, spur number and development of the abdominal spines.

An index to all specific names in N. A. Limnephilidæ follows the check-list to facilitate its use. The numbers refer to the serial designations of the list. Where the name is not now retained in its original genus, this is given after a comma. Other genera to which a species has been referred are cited in square brackets.

⁷ Forsslund, Karl H., "Revision der Zetterstedtschen Trichopteren aus Lappland," in Ent. Tidskr. 51; 83-85: 1929.

Check-list of the North American species of LIMNEPHILIDAE.

Acronopsyche Banks.

1. occidentalis (Bks.)
 pilosa Bks.
 [Genotype]

Algonquina Banks.

- Apolopsyche* Bks.
2. centralis (Bks.)
 pallidus (Bks.)
 signata (Bks.)
3. minuscula (Bks.)
4. parvula (Bks.)
 [Genotype]
 pallida (Bks.)
5. pilosa (Bks.)
6. renoa Milne.

Allomyia Banks.

7. tripunctata Bks.
 [Genotype]

Anabolia Stephens.

8. bimaculata (Wlk.)
 sordida Hag.
9. modesta (Hag.)
10. mutata (Hag.)
11. nigricula Bks.
12. pacifica (Bks.)
13. planifrons (Kol.)
 curta Bks.
 montana Bks.
- 13a. simplex (Bks.)
 emarginata Bks.

Anabolina Bks.

Rheophylax Sibley.

14. assimilis Bks.
15. canadensis (Bks.)
16. diversa Bks.
 [Genotype]
17. litha Milne.
18. producta (Bks.)
19. spinata (Bks.)
20. submonilifer (Wlk.)
- Anisogamus McLachlan.
21. antennatus (Bks.)
22. atripennis Bks.
23. costalis Bks.
24. disjunctus Bks.
25. edwardsi Bks.

Apatelia Wallengren.

- Apatania* Kol.
26. nigra (Wlk.)
27. shoshone (Bks.)
28. stigmatella (Zett.)
 frigida (M'L.)
 pallida (Hag.)

Arctoecia McLachlan.

- Leptophylax* Bks.
29. consocia (Wlk.)
 medialis (Bks.)
30. gracilis (Bks.)
31. ozburni Milne.
32. brevipennis (Bks.)

Astenophylax Ulmer.

33. argus (Harr.)

- [Genotype here designated]
- Carborius Navas.
Allophylax Bks.
34. punctatissimus (Wlk.)
 [Genotype]
- Chilostigma McLachlan.
 35. alascense (Bks.)
 36. difficile (Wlk.)
coagulata Hag.
pallida Bks.
37. missum Milne.
coagulata Bett. nec Hag.
38. præteritum (Wlk.)
 39. subboreale Bks.
- Colpotaulius Kol.
 40. minusculus Bks.
 41. perpusillus (Wlk.)
secludens (Bks.)
tarsalis Bks.
42. quæris Milne.
 43. rhæus Milne.
- Dicosmoecus Ulmer.
 44. aripes (Hag.)
grandis Ulm.
45. gilvipes (Hag.)
 46. unicolor (Bks.)
tristis (Bks.)
coloradensis Ulm.
quadrinotata (Bks.)
- Drusinus Betten.
 47. uniformis Bett.
48. virginicus (Bks.)
sparsus (Bks.)
calypso (Bks.)
- Ecclisomyia Banks.
 49. conspersa Bks.
 [Genotype]
50. maculosa Bks.
 51. scylla Milne.
 52. simulata Bks.
- Eustenace McLachlan.
 53. gentilis (McL.)
 54. limbatus (McL.)
 [Genotype]
- Glyphopsyche Banks.
 55. areolatus (Wlk.)
 56. bellus (Bks.)
 57. canadensis (Bks.)
 58. irroratus (Fab.)
 [Genotype]
interciscus (Wlk.)
bryanti Bks.
59. pritus Milne.
 60. ullus Milne.
- Glyphotælius Stephens.
Glyphidotaelius Kol.
61. hostilis Hag.
- Grammotaulius Kolenati.
 62. bettenii H.-Griff.
 63. interrogationis (Zett.)
 [Genotype here designated]
praecox Hag.

64. *consimilis* (Bks.)
 65. *designatus* (Wlk.)
 occidentalis (Bks.)
 [Genotype]
 alascensis (Bks.)
 magnus Bks.
- Homophylax Banks.
 66. *crotchi* Bks.
 67. *flavipennis* Bks.
 [Genotype]
 68. *nevadensis* Bks.
- Ironoquia Banks.
 69. *parvula* Bks.
 [Genotype]
- Limnophilus Leach.
 Limnophilus Burm.
70. *abbreviatus* Bks.
 71. *argenteus* Bks.
 72. *bifidus* Bks.
 73. *clausus* Bks.
 74. *cockerelli* Bks.
 75. *coloradensis* Bks.
 76. *combinatus* Wlk.
 rhombicus Vorh. nec L.
77. *concolor* Bks.
 78. *crassus* Bks.
 79. *despectus* Wlk.
 multifarius Wlk.
 perforatus Wlk.
 plaga Wlk.
 decepta (Bks.)
 eminens Bett.
80. *elongatus* Bks.
 81. *externus* Hag.
- oslari* Bks.
flavastellus Bks.
82. *extractus* Wlk.
 hyalinus Hag.
83. *gravidus* Hag.
 rotundatus Bks.
84. *hageni* Bks.
 85. *harrimani* Bks.
 aequalis Bks.
86. *infernalis* (Bks.)
 87. *luteolus* Bks.
 88. *kennicotti* Bks.
 89. *kincaidi* Bks.
 90. *macgillivrayi* Bks.
 91. *moestus* Bks.
 92. *morrisoni* Bks.
 93. *nebulosus* Kby.
 stipatus Wlk.
 subpunctulatus Wlk.
94. [*nigriceps* (Kol.)]
 94a. *forcipatus* Bks.
 95. *occidentalis* Bks.
 96. *oreus* Milne.
 97. *ornatus* Bks.
 98. *perjurus* Hag.
 adustus Bks.
99. *pulchellus* Bks.
 100. *radiatus* (Say.)
 101. *rho* Milne.
 102. *rillus* Milne.
 103. *roberti* Bks.
 104. *rohweri* Bks.
 105. *sansoni* Bks.
 106. *sitchensis* (Kol.)
 pacificus Bks.
107. [*stigma* Curt.]
 107a. *indivisus* Wlk.

- | | |
|---|---------------------------|
| 107b. sackeni Bks. | [Genotype] |
| 108. sublunatus (Prov.) | |
| <i>americanus</i> Bks. | Rhadicoleptus Wallengren. |
| 109. vastus (Hag.) | 120. flavicollis (Bks.) |
| <i>intermedius</i> Bks. | 121. fumosus (Bks.) |
| Neophylax McLachlan. | Stenophylax Kolenati. |
| 110. concinnus (McL.) | <i>Hydatophylax</i> Wall. |
| [Genotype] | <i>Potamophylax</i> Wall. |
| <i>autumnus</i> Vorh. | <i>Pycnopsyche</i> Bks. |
| <i>sinuatus</i> Nav. | <i>Allegophylax</i> Bks. |
| <i>mitchelli</i> Carp. | 122. circularis (Prov.) |
| 111. fuscus Bks. | 123. dan (Sib.) |
| <i>consimilis</i> Bett. | 124. divergens (Wlk.) |
| 112. ornatus Bks. | 125. flavatus Bks. |
| 113. rickeri Milne. | 126. formosus (Bks.) |
| | <i>maculatus</i> (Bks.) |
| Oligophlebodes Ulmer. | 127. hesperus Bks. |
| 114. ara Milne. Sigma | 128. luculentus Bett. |
| 115. minutus Bks. | 129. magnificus (Bks.) |
| <i>coloradensis</i> Ulm. | <i>magnus</i> (Bks.) |
| [Genotype] | 130. scabripennis (Rbr.) |
| | <i>antica</i> (Wlk.) |
| Platycentropus Ulmer. | 131. sonso Milne. |
| <i>Hylepsyche</i> Bks. | <i>subfasciatus</i> Carp. |
| 116. amicus (Hag.) | nec Say. |
| 117. indistinctus (Wlk.) | 132. subfasciatus (Say.) |
| 118. maculipennis (Kol.) | <i>lepida</i> (Hag.) |
| <i>hostis</i> Hag. | |
| | Zaporota Banks. |
| Psychoronia Banks. | 133. pallens Bks. |
| 119. brevipennis (Bks.) | [Genotype] |

The species described or listed from Greenland and Alaska but unknown to the author have been omitted herein.

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Mailed Monday, January 21, 1935.

AMERICAN TRICHOPTERA, 2

Errata⁸

- p. 28 couplet 25, for 78 read 80
p. 29 couplet 32, for *Drusus* Stephens read *Drusinus* Betten
p. 34 couplet 57, for [56.] read [56,73.]
p. 38 couplet 73, for 76 read 74
couplet 74, for 66 read 76
couplet 75, for 99 read 91
couplet 76, for [75,73.] read [75,74.]
p. 39 couplet 80, for [76.] read [25,76.]
p. 49 l., for occidentalis read occidentis

20., insert *pudicus* (Hag.)

26., insert *incerta* (Bks.)

p. 50 after Grammotaulius, insert
Halesochila Banks.
63.5 *taylori* (Bks.)

p. 51 line before 64., insert *Hesperophylax* Banks.

line after 107^a., insert *subguttatus* Wlk.

p. 52, insert 108.5 *tersus* Bett.

insert 126.5. *guttifer* (Wlk.)
similis (Bks.)

p. 53 column 1, lines 4-7 , read

alascense (Halesus) 35.

alascensis (Asynarchus)

[*Phryganomyia*] = *Agrypnia*

glacialis Hag. [*Phryganeidæ*.]

⁸ The spacing of phrases to be inserted is such as to

allow adequate margin for cutting out and pasting on. Removal of the page for cutting will not mar the sequence of future "Studies;" this sheet is unnumbered.

Complete Errata in "Studies in N.A. Trichoptera, 1."

- p. 3, line 4, read "straight ventro-caudad."
 28, read "♀ 8th sternite broad:"
 p. 5, line 9, for "♂" read "♀"
 p. 7, line 10, read "a. *Agrypnetes* M'L."

- p. 8, genus *Limnocentropus* Ulm., read
 "29. *borneonius* Ulm.
 30. *insolitus* Ulm.

Haplotype.

a. *himalayanus* Mart."

This will alter the numerals up to No. 52.

- p. 9, after line 5, column 1, insert "52. *tibetana* Mart."
 column 2, for "*Ecclisopteryx*" read

"*Ecclisomyia*."

after "*concatenata* Wlk., '52." insert "Genotype."

- p. 10, line 3, for "1st" read "3rd"
 30, for "*palpalis*" read "*palpata*"

- p. 15, couplet 25, for "(24.)" read "(22.)"

- p. 16, line 2, for "Curtis" read "McLachlan"

after line 5, insert "Haplotype: *S. parva* (Bks.)"

- p. 19, after No. 19, insert synonyms—

"*micans* Hag. '61;

sagitta Hag., id.;

flaveolata Hag., id.;

parvula Bks., '99;

flavida Bks., id.;

inornata Bks., '07;

apicalis Bks., id.;

incerta Bks., '07; nec Wlk., '52."

after No. 25, insert synonym—"florida Bks."

